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Group Art Unit 3641
Examiner Edward A. Miller

Graylon K. WILLIAMS, et al

REQUEST FOR
RECONSIDERATION

Serial No. 09/664,130

Filed September 18, 2000

For: GAS GENERANTS CONTAINING
SILICONE FUELS

August 6, 2002

Assistant Commissioner For Patents
Washington, D. C. 20231

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Sir:

Responsive to the office action mailed on March 12, 2002, applicants respectfully traverse the rejection of claims 1-13 and 16-18 for the following reasons. Applicants note that the examiner has inadvertently included a claim 19 that is not part of the application. Accordingly, applicants simply comment on claims 1-13 and 16-18.

Claims 1-13 and 16-18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Grebert et al. (3,986,908) in view of Plantiff et al. (3,964,256), Hamilton (4,309,229), Ochi et al. (5,656,793), Taylor et al. (5,538,568), and Hackett et al. (3,453,156).

As broadly claimed in claim 1, the present invention includes silicone as a fuel, an oxidizer selected from the group consisting of metal and nonmetal perchlorates, and a coolant selected from the group consisting of alkali, alkaline earth, and transitional metal carbonates, bicarbonates, oxalates, and hydroxides.

I hereby certify that this correspondence is being deposited with the U.S. Postal Service in an envelope with sufficient postage as first class mail addressed to: Assistant Commissioner For Patents, Washington, D.C. 20231, on August 6, 2002.

Name of person mailing: C. Gail Boes Signature: C. Gail Boes Date 8-6-02

As detailed on page 6 and in Table 1 of the specification, compositions containing silicone and a perchlorate oxidizer exhibit rapid and sustained burn rates (at 3000 psi) greater than or equal to one inch per second. At ambient pressure these compositions exhibit burn rates at approximately 0.4 inches per second or greater and provide adequate amounts of gas. An inherent benefit of a reduced operating pressure, therefore, is that inflators associated with these compositions exhibit satisfactory burn rates and gas production while reducing the necessity of a robust inflator design. However, without the coolant, compositions containing silicone and a perchlorate oxidizer may exhibit relatively high temperatures. See examples 2 and 3 as compared to examples 17, 21 and 24 of Table 1. As explained below, the prior art cited simply does not teach or suggest the compositions of the present invention. Stated another way, the prior art does not describe or suggest compositions exhibiting the multiple benefits of improved combustion properties at ambient operating pressure, a relatively lower operating temperature, and adequate amounts of gas.

Grebert et al. teaches compositions containing metal and nonmetal perchlorates and silicone rubbers as organic binders. Grebert does not teach or suggest the use of coolants as presently claimed.

Plantif et al recognizes the benefit of forming compositions containing perchlorate oxidizers and silicone resin. Plantif also recognizes the benefit of coolants, but **teaches away** from their use in solid propellants when the gases to be produced are non-toxic (as in occupant restraint systems). See column 1, lines 12-31. As such, Plantif incorporates outboard coolants as recognized by the examiner, but does not contemplate or suggest the use of a coolant integral to the gas generant composition. When a reference teaches away from an invention, it is well founded that it cannot suggest the same.

Hamilton also **teaches away** from the present invention. At column 1, lines 45-50, Hamilton summarizes the invention:

In accordance with the present invention, a combustible mixture of carbon, an oxidizer which does not contain hydrogen and,

optionally, a coolant are mixed to form a combustible material which produces non-toxic gas rapidly, at relatively low temperature, and *without the production of water vapor*. (Emphasis added)

Silicone, as described in Formulas 1 and 2 of the present invention, for example, often contains an abundant amount of hydrogen. This contravenes Hamilton because of the propensity for compositions containing silicone to produce at least minimal amounts of water.

Ochi et al. does not suggest any fuel (or reducing agent) other than HDCA or hydrazodicarbonamide. The structure of HDCA is markedly different from silicone. Compare Formula 1 of Ochi with Formulas 1 and 2 of the present invention. The examiner's attention is also directed to Tables 2, 5, and 6 as found in Ochi. The "In-tank gas temperature (°C)" resulting from combustion of compositions described by Hamilton ranges from 152 to 407 °C. When viewed in light of Ochi's objects of the invention as described in column 2, lines 5-35 (e.g. low combustion temperature), one of ordinary skill in the art would not be motivated to replace the low heat generating HDCA with silicone. The use of silicone results in temperatures in excess of 2000°C as given in Table 1 on pages 6 and 7 of the specification. Therefore, Ochi et al. also teaches away from the present invention.

Although Taylor describes the use of perchlorates in compositions, the similarity ends there. Neither does Taylor offer any motivation or suggest formulation of the present compositions when viewed in light of Grebert. Taylor has as an object of the invention, production of an easily extrudable composition that is readily cured at room temperature, and mixed at low viscosity. See the "Summary of the Invention". These objects simply differ from the benefits characterized in the present invention. As such, one of ordinary skill in the art would not be motivated to consider Taylor when formulating the present compositions. A prima facie case of obviousness cannot be supported without the requisite showing of a suggestion or motivation to combine the references. Again, Taylor falls short in this regard.

Finally, in the same way, Hackett fails to cure the deficiencies of the

references cited. Although Hackett recognizes the usefulness of silicone and inorganic perchlorates, he does not offer any motivation or suggestion to combine silicone with a perchlorate oxidizer and a coolant.

In sum, none of the references when taken alone or when taken together suggest or describe the present invention. Stated another way, for the reasons given, a prima facie case of obviousness cannot be supported by references that teach away from the present invention, nor can it be supported without the requisite showing of a motivation to combine the references.

Accordingly, applicants respectfully traverse the rejection of claims 1-13 and 16-18 and courteously solicit the allowance of these claims and passage of the subject application to issue. Concurrently herewith, applicants petition for a two-month extension for the period of response and include the appropriate fee.

Applicants have calculated a fee \$400.00 of to be due in connection with this paper. Our check numbered 16672 is included in that amount. The commissioner is hereby authorized to charge Account No. 04-1131 for any deficiency. A duplicate copy of the first page of this transmittal is also included.

Respectfully submitted,

Date

8/6/02

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